

# Overdekkings- en verschuivingsmetingen met resonantieneutronen

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## SUMMARY.

Absorption and scattering measurements are performed on the following resonance neutrons: *Cu* 5 min, *Cd* 4 hr, *Ag* 22 sec and *Au* 66 hr.

A complete theory is given of the new DE VRIES' method for determining the level width $\Gamma$ from the energy loss in elastic collissions. This „displacement" method provides us with a check upon the form of the resonance level. In short, in this method one has to do with an artificial case of overlapping in which $\Gamma$ is the only unknown quantity; the distance between the „levels" is given by the energy loss and may be varied by taking scatterers of different atomic weight. As to the *Ag*-22 sec level the experimental results rather agreed with a level form according to BREIT-WIGNER than with a GAUSS curve. For *Ag* 22 sec a level with $\Gamma_{eff} = 0{,}9\ eV$ has been derived, in accordance with former measurements. For the scattering cross-section $\sigma_v$ the following values are obtained ($10^{-24}$ cm$^2$): *C* (2,1), *Al* (~1), *Si* (2,2), *S* (1,0), *Fe* (6,2), *Zn* (5,3), *Cd* (~6), *Sn* (4,8), *Pb* (6,4). The conclusion is, the $\sigma_v$ seems to be no monotonic function of the atonic weight, and (in comparing the values now obtained to former measurements) we find that $\sigma_v$ practically does not vary with the energy in the region $E_{th}$—200*eV*.

Attention is drawn to the *„refilling* effect": if a certain group of neutrons has been absorbed by a resonance absorber, a „hole" is present in the neutron distribution. This hole at the energy $E_r$ may be refilled by interposing a second (scattering) absorber (properly speaking, the hole is shifted towards lower energies). This refilling effect should by no means be overlooked in absorption and scattering measurements with resonance neutrons.

By means of a combination of the boron method and overlapping measurements it could be proved that a level of $^{66}Cu$ 5 min ($E_r = 135 \pm 15\ eV$) is overlapped by a higher level of $^{110}Ag$ 22 sec. and at the same time by a level of $^{117}Cd$ 4 hr. The total non thermal *Cu* 5 min activity must be ascribed to the contribution of at least 3 groups of neutrons; these are: the resonance level at 135 *eV* (contribution 35%) a group at higher energy ($E \approx 1000\ eV$, contribution $\approx$ 45%) and a group of low energy (at about 2,5 *eV*, contribution 20%). The latter

can be identified as the $\frac{1}{v}$ region above the cadmium cut off, which in the case of *Cu* 5 min may not be neglected on account of the high value of $\sigma_{th}$.

The boron absorption curve of *Au* 66 hr is determined up to very thick layers of boron. It is shown that the *Au* resonance activity is due to more than one level: 2/3 of the total activity must be ascribed to a level at 2.2 ($\pm$ 0.3) *eV* and 1/3 to one or more higher levels at a mean energy of about 50 *eV*.